DOCUMENT RESUME

ED 115 276 IR 002 821

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TITLE Personalizing Instruction for the Middle School Learner: The Instructional Role of the School Media Specialist. Final Report.
INSTITUTION Florida State Univ., Tallahassee. Career Education Center.
PUB DATE 27 Aug 75
NOTE 72p.

EDRS PRICE MF-$0.76 HC-$3.32 Plus Postage
DESCRIPTORS Educational Research; Grade 8; *Individualized Instruction; Learning Processes; *Media Specialists; *Middle Schools; *Multimedia Instruction; Role Perception; Teaching Models; Teaching Techniques
IDENTIFIERS Florida; *Fort Clarke Middle School

ABSTRACT

An investigation was made to determine the instructional function of the professional media staff in a school. The objectives of the study were: (1) to develop a model to add the expertise of the media specialist to the teaching team; (2) to access the effect the model had on the academic achievement and self-concept of students; and (3) to determine the effect the model had on the attitudes and instructional performance of educators. The study was divided into five parts. Part 1 developed a rationale for making the expertise of the media specialist available to the teaching team, and part 2 introduced the theoretical model of the instructional function of the media specialist. Part 3 dealt with the implementation of the theoretical model at Fort Clarke Middle School in Gainsville, Florida, and part 4 examined the evaluation information emerging from the project. Finally, part 5 summarized the conclusions and recommendations that grew out of the investigattion. (Author/HB)

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PERSONALIZING INSTRUCTION FOR THE MIDDLE SCHOOL LEARNER--THE INSTRUCTIONAL ROLE OF THE SCHOOL MEDIA SPECIALIST

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FINAL REPORT
August 27, 1975

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PERSONALIZING INSTRUCTION FOR THE MIDDLE SCHOOL LEARNER
FINAL REPORT

INTRODUCTION

The final report of Personalizing Instruction for the Middle School Learner is aimed at acquainting the reader with relevant information produced by an investigation of the instructional function of the professional media staff in a school. Specifically, the objectives of this study were:

(1) to develop a model which outlines a method of effectively adding the unique expertise of the school media specialist on a systematic basis to that of other members of the teaching team in order to personalize instruction;

(2) to assess the effect which implementation of the model had on the academic achievement and self concept of students involved in the experiment; and,

(3) to determine the effect which implementation of the model had on the attitudes and instructional performance of educators involved in the project.

The description of this study is divided into five parts. Part I offers a rationale for making the unique expertise of the media specialist available on a systematic basis to the teaching team. Part II introduces the theoretical model of the instructional function of the school media specialist. Part III deals with the implementation of the theoretical model at the Fort Clarke Middle School in Gainesville, Florida. Part IV examines the evaluative information emerging from the project. And, Part V offers conclusions and recommendations growing out of this investigation.

PART I

THE MEDIA SPECIALIST'S ROLE ON THE TEACHING TEAM

Although an increasing number of educators are cognizant of the importance of using various types of media to provide pupils with learning opportunities,[1] they frequently fail to recognize that professional media personnel possess specialized technical expertise in the use of media to individualize instruction.[2] Instead, teachers are expected to utilize the full range of media to provide appropriate learning alternatives in spite of the fact that they usually lack the necessary time, and are generally disinterested in or uninformed about these modes of instruction[3] and the media resources which accompany them.[4] Thus, new programs and approaches for personalizing instruction are severely handicapped since they require student use of a much wider variety and greater number of instructional materials than were formerly employed in the classroom.

Realistically, the multiplicity of roles and functions which are associated with the instructional process preclude the possibility of a teacher's acquiring all the technical competencies necessary to meet the individual learning needs of students.[5] For this reason, the concept of specialization within the educational process has

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[1]John B. Harvey and Edon J. Ulmer, Educational Media and the Teacher, Issues and Innovation in Education Series (Dubuque, Iowa: Wm. C. Brown Co., 1970), pp. 6-24.

[2]Martin Rossoff, The School Library and Educational Change, Library Science Text Series (Littleton, Colo.: Libraries Unlimited, Inc., 1971), p. 2.

[3]Paul W. F. Witt, "Educational Technology: The Education of Teachers and the Development of Instructional Materials Specialists," in Technology and the Curriculum, ed. by Paul W. F. Witt (New York: Teachers College Press, 1968), p. 56.

[4]Ralph Perkins, "The Prospective Teacher's Knowledge of Library Fundamentals," in Instructional Materials Centers; Selected Readings, ed. by Neville P. Pearson and Lucius Butlers (Minneapolis: Burgess Publishing Co., 1969), p. 63.

[5]Donald K. Sharpes, "A Model of Differentiated Teaching Personnel," in Educational Manpower; From Aides to Differentiated Staff Patterns, ed. by James L. Olivero and Edward G. Buffie, Bold New Venture Series (Bloomington: Indiana University Press, 1970), p. 168.

gained increasing support. One of the most common manifestations of this trend is team teaching, an organizational pattern which attempts to effect optimum educational results by utilizing the professional and personal strengths of various types of educational specialists working concomitantly.[6]

Within this framework professional media personnel can contribute significantly to the effectiveness of the teaching team because they possess many skills and competencies in the knowledge of media and their application in the learning process which a large number of other team members lack.[7] Thus, the media specialist functioning in an instructional capacity serves as a process specialist who blends her unique talents with those of the content specialist (the teacher) to formulate appropriate learning alternatives for individual students. The scope of the media specialist's contribution to the educational process is clearly outlined in Media Programs; District and School.[8] This publication describes instructional planning, design, implementation and evaluation services as well as other major services related to media which focus on accommodating the needs of teachers and students in a modern educational setting where individualization is the goal.

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[6]Herbert I. Von Haden and Jean Marie King, Innovations in Education: Their Pros and Cons (Worthington, Ohio: C. A. Jones Pub. Co., 1971), p. 157.

[7]Robert Edward Fite, "The Range of Media," in Instructional Media Center; Bold New Venture, ed. by Harold S. Davis (Bloomington: Indiana University Press, 1971), p. 79.

[8]American Association of School Librarians and Association for Educational Communications and Technology, Media Programs; District and School (Chicago: American Library Association, and Washington, D. C.: Association for Educational Communications and Technology, 1975).

PART II

MODEL OF THE INSTRUCTIONAL FUNCTION OF THE SCHOOL MEDIA SPECIALIST

Introduction

As a result of this project, a theoretical model was developed to allow the media specialist to function effectively in an instructional capacity. The model is based on an instructional planning system (Individually Guided Education process) to demonstrate the manner in which the media specialist contributes to the teaching team during each phase of the instructional process.

The Model

In Figure 1, a simplified version of the model of the instructional function of the school media specialist is presented so that the reader can concentrate on basic instructional relationships between the media specialist and the teacher. Other relationships, such as those existing between the instructional and instructional support functions in the media program are not included at this point because they require more detailed explanation than can be given clearly and concisely in this graphic representation. However, these and other important aspects of the model will be discussed when the Individually Guided Education (IGE) process is examined in greater detail.

Investigation of the graphic model reveals a number of major areas in which the media specialist can make her contribution in the instructional process. These areas relate chiefly to facilitating the analysis, selection, organization, production, utilization, and evaluation of materials and media related activities that serve as a basis for learning alternatives geared to student learning needs.

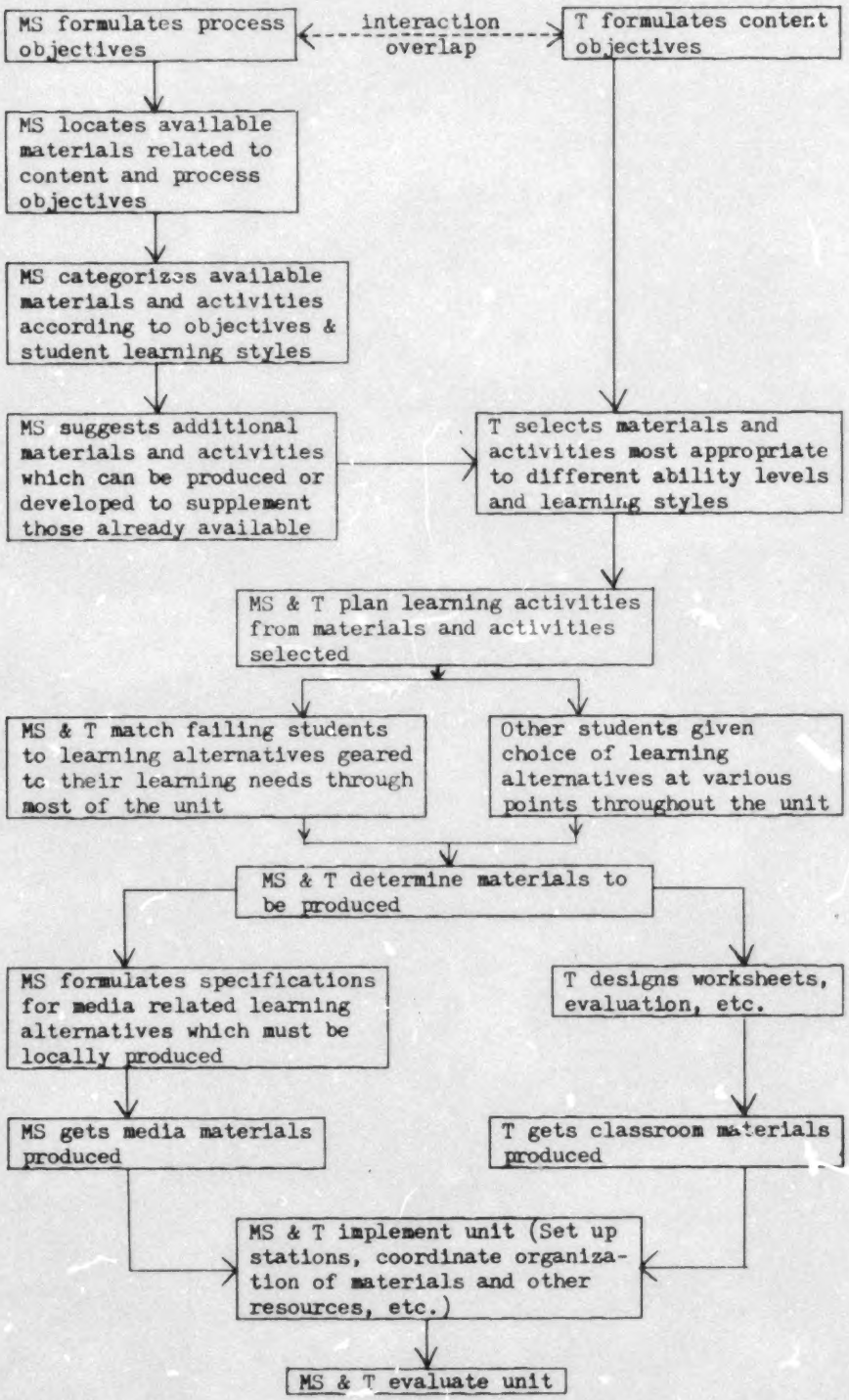
A broader and more extensive view of the means of incorporating the skills and competencies of various media personnel effectively in the instructional process can be gained through an analysis of the proposed role of the media team in the IGE process. However, prior to defining the media staff's role in the IGE model, factors which play a large part in determining the success which media personnel will experience when functioning in an instructional capacity in any instructional model should be considered.

First, the media specialist must have time to carry out instructional responsibilities. Working with teaching teams in an effective manner on a regular basis is a full

Figure 1

MODEL OF THE INSTRUCTIONAL FUNCTION OF THE SCHOOL MEDIA SPECIALIST

MS= Media Specialist T= Teacher(s)


MS formulates process objectives
interaction overlap
T formulates content objectives
MS locates available materials related to content and process objectives
MS categorizes available materials and activities according to objectives & student learning styles
MS suggests additional materials and activities which can be produced or developed to supplement those already available
T selects materials and activities most appropriate to different ability levels and learning styles
MS & T plan learning activities from materials and activities selected
MS & T match failing students to learning alternatives geared to their learning needs through most of the unit
Other students given choice of learning alternatives at various points throughout the unit
MS & T determine materials to be produced
MS formulates specifications for media related learning alternatives which must be locally produced
T designs worksheets, evaluation, etc.
MS gets media materials produced
T gets classroom materials produced
MS & T implement unit (Set up stations, coordinate organization of materials and other resources, etc.)
MS & T evaluate unit

Consultation between teacher(s) and the media specialist occurs throughout each step of the model.

time job which rarely can be combined efficiently by one person with administering the media program--also a full time professional responsibility.

Second, the media specialist must have the opportunity to work with the teaching team throughout the instructional cycle from planning through evaluation with ample chances to offer input and gain information during each step of the process.

Third, instructional units should be planned four to six weeks before they are implemented in order to allow sufficient time to locate the resources necessary to provide the best learning alternatives for a unit.

Fourth, the media specialist must possess a means of establishing how individual students best perceive meaning, so she can more effectively suggest learning alternatives to match learning styles of students.

Each of these concepts received careful attention when the media staffing pattern in this project was being developed.

The Media Staff and the IGE Process

The Individually Guided Education Model was selected as the model to provide the overall guidelines for planning, implementation, and evaluation of instruction in this project. Some of the major reasons for this choice were the model's focus on teaming and personalization of instruction through the use of a variety of learning alternatives, the commonalities which the IGE model shared with other instructional models (making it much easier to modify concepts and apply them in other types of instructional situations), and its provision of six weeks between the planning of instructional units and their implementation.

The major steps of the IGE Process are outlined at this time in order to indicate how the media team can function effectively within an instructional model.

I. Instructional team identified.

The media specialist working in an instructional capacity is assigned on a permanent basis to the teaching team or teams. Requests by teaching team members for services rendered by other members of the media team are generally funneled through the

team media specialist; however, this does not preclude other members of the media staff from working with the teaching team when indicated.

II. Team organizes to facilitate instructional planning for units.

A. Team and other types of meetings to be held on a regular basis scheduled.

B. Team media specialist's role in facilitating unit planning specified:

1. Attends scheduled team meetings.

2. Schedules meetings with team members individually on a regular basis to help them develop, implement, and evaluate learning alternatives.

Activities which occur during these meetings are:

consideration of logistical problems related to learning alternatives.

examination of student progress to see how effectively learning alternatives presently being used are working.

determination of needed changes in learning alternatives when indicated.

indication of materials that need to be produced, and formulation of plans to get them produced by team members, other members of the media staff, county media personnel, team aide, students, etc.

3. Makes plans to allow time each week to observe students using learning alternatives and talk with them to get their reaction to various learning alternatives they are using. This information will be part of individual teacher conferences to serve as one basis for making changes and for indicating future direction for learning alternatives.

III. Team examines characteristics of the student population assigned to the team.

A. Examines information in student folders relating to achievement, etc.

B. Examines information from inventories describing individual student learning styles.

IV. Team examines goals and objectives of the curriculum.

Media specialist will be involved as a member of the teaching team in performing this task.

V. Team develops goals for their class or team's instructional program.

Media specialist participates as a member of the teaching team. She insures the inclusion of process objectives related to methods of communicating or being communicated with more effectively, i.e., becoming a discriminating viewer.

VI. Team describes instructional roles indicated.

A. Team media specialist's basic role--A process specialist whose expertise is in the area of helping teachers (content specialists) to devise learning alternatives to convey information, concepts, values, etc. to individual students in an effective manner.

1. Helps teachers on team/teams to develop, select, organize, analyze, implement, and evaluate learning alternatives. Specifically, this includes:

a. offering logistical help or support in scheduling and use of learning alternatives.

b. performing materials analysis based on student learning styles.

c. making suggestions of various ways in which concepts might be presented to students more effectively based on pupil learning styles.

d. helping teachers to determine the types of student learning styles which are already being accommodated by the materials and approaches included in a unit.

e. establishing contact with county media staff to obtain additional services for developing team learning alternatives which cannot be produced in the school, but generally not for such things as making out film orders and other clerical duties.

f. producing materials required for learning alternatives on a very limited scale.

g. suggesting materials needed by the teaching team which should be ordered by other members of the media staff for the media collection.

h. sharing information about new educational and media developments with other teaching team members.

i. engaging in continuous evaluation and modification of learning alternatives based on feedback gained from observation, interaction with students about their reactions to learning alternatives, and discussions with other team members.

j. assisting in or performing a field test of learning alternatives with representative students in the school.

k. working with other parts of the media team including clerks to secure equipment, materials, and services required for learning alternatives.

B. Chief roles of other professional members of the media staff:

1. organize and administer the media program.

2. arrange for efficient and effective storage and retrieval of resources.

3. provide media guidance and reference services.

4. coordinate collection building.

5. evaluate and plan the direction of the overall media program.

6. conduct inservice training sessions when indicated.

7. formulate media program budget.

8. coordinate media systems.

C. Role of clerical staff in relation to teaching team.

This role will depend on the amount of clerical aide time allotted to the team and/or the duties to be performed for

the teams by the clerks. When this is decided, the team will determine how their portion of the clerk's time will be spent. Some duties might include running off transparencies, writing up film and other types of orders for resources after the team has decided what it wants, filing locally produced and other types of materials which have been used as learning alternatives, and other clerical duties.

VII. Team evaluates its strengths in terms of the instructional roles indicated by program goals.

VIII. Staff development needs determined.

IX. Team planning roles assigned on basis of team strengths and staff development possibilities.

X. Team identifies goals for unit(s).

Media specialist participates as a member of the team and offers input as appropriate (goals in areas of basic skills--viewing, listening, etc.).

XI. Curriculum area(s) identified.

XII. Teachers with the assistance of the team media specialist begin to research their specialty areas.

XIII. Teacher(s) and media specialist assigned to develop instructional plan.

Media specialist assists teacher(s) by performing the following functions:

A. helps teachers consider how to teach content in terms of learning alternatives indicated by students' preferred learning styles.

B. helps teachers to examine and determine resources which might be helpful in teaching unit.

C. offers evaluative input on effectiveness of various types of alternatives used in the past with suggestions of changes which might be made.

D. helps determine what materials must be locally produced and how this might be accomplished.

E. helps to determine logistical problems which must be considered in order to implement the instructional plan.

F. helps to determine types of assessment which might be used especially when learning alternatives include various types of media.

G. helps to analyze materials in terms of student learning styles.

H. helps to identify means for systematically organizing what activities will take place when, where, and how.

XIV. Instructional plan presented to the team for critiquing, modification, and approval.

XV. Teachers assigned to implement the instructional plan.

Media specialist works with each teacher to implement the instructional plan.

A. Learning alternatives are organized for students.

1. materials, equipment, areas where instruction will take place, and other resources are scheduled.

2. materials are produced when necessary.

3. assessment plans are finalized for pre and post-testing.

B. Learning alternatives are field tested when possible by the teacher and the media specialist.

C. Strategies are refined as are individual learning alternatives.

XVI. Plan of instruction implemented.

A. Examine the basic role of the media specialist presented on page 8 in order to identify the functions of the media specialist during this part of the instructional process.

B. Situational meetings--involved team members (media specialist and teacher(s) meet frequently to discuss problems which arise as the unit is implemented, and/or modifications are indicated.

XVII. Team critiques the unit as it ends to determine the unit's strengths and weaknesses.

XVIII. One week after the unit begins recycling starts.

XIX. Cycle completed, evaluated, and restarted.

Analysis of the media team's proposed role in the IGE model suggests the continuum of essential media services which must be available in order to personalize instruction. When these services are neglected or delegated to other less qualified personnel the chances of meeting individual student learning needs diminish considerably.

PART III

IMPLEMENTATION OF THE MODEL

The theoretical model of the instructional function of the media specialist was implemented at the Fort Clarke Middle School in Gainesville, Florida, during the 1974-75 school year. In the past this school of approximately 1100 students had a media staff of two professional media specialists who generally performed standard instructional support functions. As a result of this project a third media specialist and two clerks were added to the media staff for a twelve month period. This additional media professional was assigned on a full time basis to work exclusively with a four person eighth grade teaching team to help them devise learning alternatives to match student learning styles.

The decision to limit this person's services to one team was made because the team was the basic instructional component in the school. Consequently, a pilot study performed with one team exposed a number of basic problems which had to be resolved, procedures which must be modified, and relationships which should be established in order to allow the media specialist to work effectively in an instructional capacity when serving more than one teaching team.

Another reason for limiting the media specialist's services to one team was to demonstrate the maximum impact which this role could have in an educational setting. Then media specialists who are attempting to obtain additional professional positions in their schools can use this project as a model to illustrate concretely the benefits of adequately staffing media programs.

Members of the teaching team including the team media specialist began participating in this project by attending a four week workshop during the summer of 1974. The first week of the workshop was devoted to examining cognitive style mapping as a means of determining how individual students seek knowledge and become informed. (An explanation of cognitive style mapping and how it was used in this project to determine learning alternatives is included in the Appendix.) A majority of the 190 students assigned to the team completed the cognitive style mapping inventory in May, 1974, so this information was available during the workshop. Careful examination of these maps illustrated the vast number of differences which existed in students' learning styles and demonstrated the need to use a wide variety of both print and non-print materials as learning alternatives to meet instructional objectives.

The second through fourth weeks of the workshop were spent systematically planning instructional units for the first six weeks

of school. The Individually Guided Education model for instructional planning was used to guide this process.

Since the IGE model provided for approximately six weeks between the planning of instructional units and their implementation, the media specialist and the teachers had adequate time to gather suitable materials from various sources. After these materials were collected, they were analyzed in terms of their usefulness in a particular unit, their achievement level, and the cognitive elements which they contained. Then, learning alternatives to match learning styles of students were devised. The time between planning and implementation of units also allowed for local production of materials to provide the widest practical array of learning alternatives.

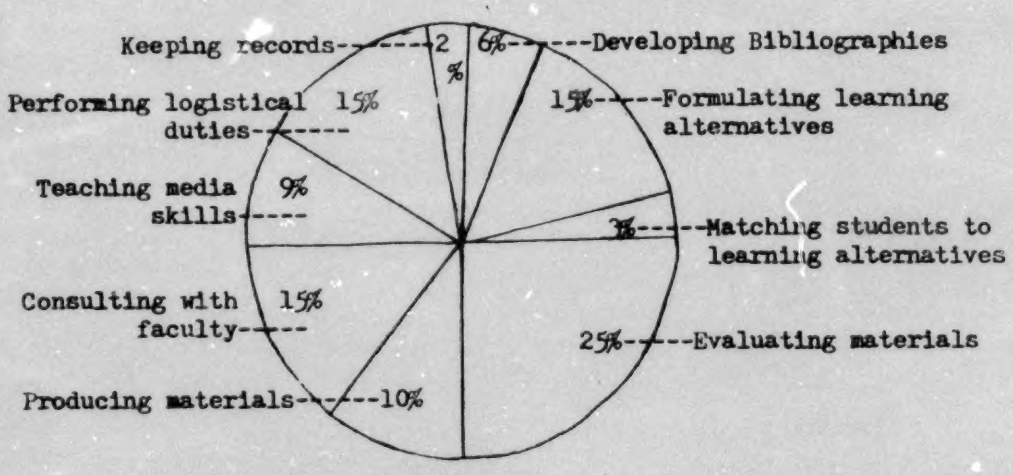
When learning alternatives for instructional objectives were implemented, the media specialist and the teachers engaged in a careful process of formative evaluation to determine the effectiveness of the alternatives. If it became obvious through observation and questioning that students were having a negative reaction to a learning alternative, the alternative was modified.

The emphasis placed on various tasks performed by the team media specialist changed somewhat during the year as she and other members of the team assimilated basic concepts related to the instructional function and experimented with various ways of managing the personalization of instruction. Other modifications occurred in the role when attempts were made to coordinate the roles of the media staff based in the media center and the media specialist working on the teaching team.

As the months passed, the primary priorities of the team media specialist became the evaluation of materials and activities, and the planning of learning strategies based on these materials. These tasks and related activities occupied approximately 56% of this professional's time. Additional time was spent working with small groups of students to help them produce materials related to units of instruction (9%), developing bibliographies of materials (6%), producing materials (10%), and performing the logistical duties of scheduling resources, ordering materials, and setting up equipment and learning centers (15%). A number of these duties, such as production of materials and performance of logistical tasks, could be handled by other staff members in situations where these personnel are available and have adequate time to complete these functions. Figure 2 gives a graphic illustration of how the team media specialist utilized her time in the performance of her role.

Figure 2

TIME ANALYSIS OF THE TEAM MEDIA SPECIALIST'S ROLE



The duties performed by other professional and clerical members of the media staff played a large part in determining the success of the media specialist functioning in an instructional capacity. The media professionals in the media center initially selected and organized most of the materials used by the team media specialist. They coordinated and administered the systems which made equipment, materials, production and other types of services available when needed by the team. They provided inservice training in the use of equipment and materials for team teachers and students. They developed bibliographies on different topics when this service was requested, and they offered media guidance and reference services to students and teachers. Clerical staff produced materials requested, processed various types of materials orders, delivered materials, and carried out other media-related clerical duties. These professional and clerical instructional support services formed the foundation on which the instructional function of the media specialist was based.

PART IV

EVALUATION OF THE PROJECT

Three types of evaluative information were used to determine the impact of the Personalization of Instruction project. First, the gains in self concept and achievement of students participating in the project were measured by statistical methods to determine if the multi-media instructional approach used with the experimental group had a measurable effect on learner attitudes and academic achievement. In the second section of this evaluation reaction sheets completed by teachers at the end of various units were examined to ascertain teacher attitudes toward the instructional strategies incorporated in the units. In addition, teachers were asked on these reaction sheets to respond to questions relating specifically to the role of the team media specialist within the unit. Finally, the administrator's perceptions of this project were explored in order to obtain a broader view of the impact of the project within the school. Evaluative information from each of these sources is essential in determining the effectiveness of this approach to instruction.

SECTION I*

The purpose of section I of this evaluation was to determine whether statistical data gathered indicated that eighth grade students who participated in the experimental program made greater gains in achievement and self concept than did eighth grade students who participated in the regular school program. The experimental program provided students with alternative learning activities, designed cooperatively by their teachers and a media specialist, taking into account students' cognitive learning styles.

The basic premises of this study were:

> Different students perceive meaning or learn in different ways.

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*Analysis of data related to achievement was performed by Dr. Sandra Damico, Test and Measurements Specialist. Analysis of data dealing with self concept was performed by Gerald G. Hodges who is presently completing a dissertation at the University of Florida which investigates the changes in self concept of students participating in this project.

The cognitive style mapping test gives an indication of the learning styles of individual students.

Students will attain a higher level of performance if they are offered learning alternatives which match their learning styles.

In order to offer the necessary learning alternatives, various types of media must be used effectively as part of the instructional process.

Teachers generally do not have the time, inclination, nor media orientation required to use various types of media effectively in planning, developing, producing, implementing, evaluating, and prescribing personalized learning activities for students.

The media specialist acting in his or her instructional capacity as a member of the teaching team can offer unique expertise in helping other team members develop, use, evaluate, and prescribe media based learning activities necessary to personalize instruction for students served by the team.

There is a strong reciprocal relationship between a positive self concept and academic achievement.

Limitations

A number of limitations were apparent in this study which may have affected the results obtained. First, a media specialist was added on a full time basis to the instructional staff of the experimental team, but an additional professional staff member was not added to the control team. However, the team media specialist did not instruct classes on a regular basis so the pupil-teacher ratio on both teams was the same. In addition, the services of other professional members of the media staff were available whenever requested by the control group.

Second, a reverse Hawthorne effect was present. The control team was determined that the experimental team was not going to outperform them, so a strong sense of competitiveness resulted in the control team.

Another factor which may have affected results was the amount of contamination which occurred. Teachers on the experimental team shared ideas and learning alternatives with teachers from the control

group because it was felt that all students would benefit from these activities.

The innovative aspects of the team media specialist's role made it necessary for her to spend much time developing and modifying new procedures, establishing different types of relationships, and resolving various questions related to her function. Consequently, this media professional did not reach full effectiveness in the instructional role until the latter part of the school year.

Finally, teachers were hesitant in some cases to allow students a choice of learning alternatives. Especially at the beginning of the project they often felt that students should complete all learning activities in a unit. This made it difficult to prescribe alternatives for students based on their learning styles.

Definitions

For the purposes of this study the following definitions were used:

Above-average learners. Learners, in this experiment, with deviation intelligence quotients (DIQ) on the Otis Lennon Mental Abilities Test (OLMAT) administered September, 1974, in the 113-149 range.

Average learners. Learners, in this experiment, with DIQ scores on the OLMAT (September, 1974) in the 98-112 range.

Below-average learners. Learners, in this experiment, with DIQ scores on the OLMAT (September, 1974) of 97 or lower.

Control group. Pupils designated as having the Traditional Approach to Instruction (TAI).

Dependent variables. The post-test standard scores on the Metropolitan Achievement Test (MAT) in the areas of Reading comprehension, Language Arts, Spelling, Math concepts, Math problem solving, Science, and Social Studies. The test scores of The Florida Key and the Self Esteem Inventory.

Experimental group. Pupils on the eighth grade instructional team who were provided with alternative learning activities, designed cooperatively by the media specialist and their teachers taking into account the students' cognitive learning styles (MSAI).

Independent variables. Instruction designed cooperatively by the media specialist and teacher taking into account students' cognitive learning styles and instruction designed without the aid of the media specialist which neglected to take into account the construct of cognitive style mapping, or what was defined as the traditional approach to instruction.

Inferred self-concept-as-learner. The inferences made by the teacher about a student as measured by The Florida Key.

Professed self-concept-as-learner. The student's own report of his or her self-concept-as-learner, as measured by Coopersmith's Self-Esteem Inventory.

Self-concept-as-learner. Defined as the attitudes, beliefs, and feelings the student has about himself or herself as a learner.

Hypotheses:

To give direction to the experiment, the following null hypotheses were tested, and in each instance the .05 level of significance was used to reject the hypothesis:

In the area of achievement:

H_1 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_2 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_3 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_4 There will be no significant differences in post-test standard scores in Reading Comprehension as

measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_5 There will be no significant differences in post-test standard scores in Reading Comprehension as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_6 There will be no significant differences in post-test standard scores in Reading Comprehension as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_7 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_8 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_9 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{10} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{11} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{12} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{13} There will be no significant differences in post-test standard scores in Math Computation as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{14} There will be no significant differences in post-test standard scores in Math Computation as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{15} There will be no significant differences in post-test standard scores in Math Computation as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{16} There will be no significant differences in post-test standard scores in Math Concepts as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{17} There will be no significant differences in post-test standard scores in Math Concepts as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{18} There will be no significant differences in post-test standard scores in Math Concepts as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{19} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{20} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{21} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{22} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{23} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{24} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{25} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{26} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{27} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

In the area of professed self concept:

H_{28} There will be no significant differences in gains between experimental and control groups on Coopersmith's Self-Esteem Inventory.

H_{29} There will be no significant differences in gains between experimental males and control males on Coopersmith's Self-Esteem Inventory.

H_{30} There will be no significant differences in gains between experimental females and control females on Coopersmith's Self-Esteem Inventory.

H_{31} There will be no significant differences in gains between experimental and control students who scored below the median on the pretest of Coopersmith's Self-Esteem Inventory.

H_{32} There will be no significant differences between the gains of experimental and control students who scored above the median on the pretest of Coopersmith's Self-Esteem Inventory.

In the area of inferred learner self concept:

H_{33} There will be no significant differences in gains between experimental and control groups on The Florida Key.

H_{34} There will be no significant differences in gains between experimental males and control males on The Florida Key.

H_{35} There will be no significant differences in gains between experimental females and control females on The Florida Key.

H_{36} There will be no significant differences between the gains of experimental and control students who scored below the median on the pretest of The Florida Key.

H_{37} There will be no significant differences between the gains of experimental and control group students who scored above the median on the pretest of The Florida Key.

Procedures

Research Design

Achievement

The research design for testing the achievement of the students participating in the experiment was a Pretest-post-test Control Group Design diagramed as follows:

R	O	X(MSAI)	O
R	O	X(TAI)	O

A pretest (Metropolitan Achievement Test) was administered in September, 1974. The Otis-Lennon Mental Ability Test was given at the same time that the achievement test was administered. Pupils in the experimental group were provided with alternative learning activities, designed cooperatively by the media specialist and their teachers taking into account the students' cognitive learning styles (MSAI). Pupils in the control group were taught through the use of the traditional approach to instruction (TAI). A post-test (Metropolitan Achievement Test) was administered in May, 1975.

Students were assigned randomly by the principal to the two eighth grade teams at Fort Clarke Middle School. Of the 377 students in the eighth grade, 188 were assigned to the experimental team and 189 to the control group.

Self-Concept-as-Learner

The research design utilized in the study of self concept was the Solomon Four-Group Design.[9] This design controlled the following threats to internal validity: history, maturation, testing, instrumentation, regression, selection, mortality, and interaction of selection and maturation. In addition, it controlled for the interaction of treatment and testing, a possible source of external invalidity.

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[9]Stanley, J. and D. Campbell, Experimental and Quasi-experimental Designs for Research. (Skokie, Illinois: Rand McNally, 1963), pp. 24-25.

The Solomon Four-Group Design is represented graphically as follows:

R	O_1	X	O_2
R	O_3		O_4
R		X	O_5
R			O_6

A random sample of 50% of the experimental group (O_1) and a random sample of the control group (O_3) were administered the pretest of Coopersmith's Self-Esteem Inventory in the first month of the academic year 1974-75. All students in both the experimental and control groups (O_2, O_4, O_5, O_6) took the post-test of the Self-Esteem Inventory in the eighth month of the academic year 1974-75. The same procedures were followed for The Florida Key.

Instrumentation

Achievement

The Metropolitan Achievement Tests were empirically standardized at two times during the year (October and April) of the 1969-70 school year. All pupils in the standardization took the Otis-Lennon Mental Ability Test as well as the appropriate battery level of the Metropolitan. The standardization samples were selected to represent the national population in terms of geographic region, size of city, socio-economic status and public vs. non-public schools. Split-half coefficients, corrected by the Spearman-Brown formula, Saupe's estimate of Kuder-Richardson formula 20 reliability, and standard errors of measurement in terms of raw scores were derived. Data were based on all pupils tested in the fall standardization with Form G. The standard errors of measurement were based on the use of split-half coefficient.

Reliability coefficients for the Otis-Lennon Mental Ability Test, Intermediate Level for grades seven, eight, and nine were determined on the basis of split-half correlations and the Kuder-Richardson and alternate-forms procedure. Standard errors of measurement were based on alternate-forms reliability coefficients. For each type of reliability, data were derived by grade and by age.

Self-Concept-as-Learner

Two instruments were used in this study to obtain the self-concept-as-learner data: The Florida Key: A Scale to Infer

Self Concept (Purkey, Cage & Graves, 1973), an observational scale, and Coopersmith's (1967) Self-Esteem Inventory, a self report (professed) instrument.

The Florida Key provides a measure of inferred learner self-concept. This instrument is completed by teachers on their students. The Florida Key consists of eighteen descriptions of classroom behaviors such as "speaks up for his own ideas?" and "gets along with other students?" Teachers rate each student on a five-point scale according to the frequency with which the specified behaviors have been observed. A total split-half reliability coefficient of .93 and an interrater reliability of .84 have been obtained for this instrument. Validation studies of The Florida Key have yielded point biserial correlations ranging from .57 (relating) to .71 (coping), with a total score correlation of .68. All validation correlations were significant at the .01 level.

The second instrument employed in this study is Coopersmith's (1967) Self-Esteem Inventory, a self report instrument. This instrument consists of 58 items to which the student responds with a mark in the "like me" or "unlike me" column after each statement. The Self-Esteem Inventory yields a total score as well as the following subscores: general self (26 items), social self-peers (8 items), home-parents (8 items), a lie scale (8 items), and school-academic self (8 items). One test-retest reliability coefficient of .88 was obtained after a five-week interval for this instrument. Using another sample of 56 subjects, a test-retest reliability of .70 was obtained after a three-year interval on this instrument.

Population

All students enrolled in the eighth grade at the Fort Clarke Middle School, Gainesville, Florida, were included in this study. These students were representative of the general population. Half of the students were randomly assigned to the experimental team and half to the control team.

Teachers for the experimental team were selected by the school's principal.

Data Collection

Achievement

Data were collected in September, 1974, and again in May, 1975. Scores on the September test, both MAT and OLMAT, were used to test

the equality of the experimental and control groups before treatment. The standard scores on the post-test (MAT) for Word knowledge, Reading comprehension, Math computation, Math concepts, Math problem solving, Language Arts, Spelling, Science, and Social Studies were used to determine whether or not there were significant differences in achievement between the experimental and control groups.

Self Concept

The pretest of the Self-Esteem Inventory was administered during the first month of the academic year 1974-1975. All students randomly selected to complete the pretest of this instrument did so at the same time, in the same room, administered by the same person. On the same day the homeroom teachers completed the pretest of The Florida Key for those students who had been randomly selected to engage in the pretest.

The post-test of the Self-Esteem Inventory was administered to all students in both the experimental and control groups during the eighth month of the academic year 1974-75. One teacher on each team administered the instrument to all the students on his/her team. The Self-Esteem Inventory was administered to the control team one school day before it was administered to the experimental team because of problems in scheduling.

The homeroom teachers completed The Florida Key for all students in the experimental and control groups over a period of one week in the eighth month of the academic year 1974-1975.

Data Analysis

Achievement

A three-way analysis of variance was made, using the post-test Standard Scores (MAT), of: (1) experimental/control; (2) male/female; and (3) ability level for the IQ ranges (above average, average, and below average pupils) on the Otis-Lennon Mental Ability Test administered in September, 1974. Significant F's were followed by Scheffe's procedure to find differences between the means. The observed F ratios for the pretest were expected to be significant because of the statistical phenomenon of regression to the mean.

Self Concept

A three-way analysis of variance was performed on post-test scores of The Florida Key and the Self-Esteem Inventory to determine if there were a significant pretest X treatment interaction, a

possible threat to external validity. None was found for either instrument.

A three-way analysis of variance was also performed on gain scores (O_2 minus O_1), (O_3 minus O_4). The main effects were pretest, sex, and treatment. All hypotheses were tested at the .05 level of significance. The observed F ratios for the pretest were expected to be significant, due to the statistical phenomenon of regression to the mean.

Results

Achievement

The aim of this research was to compare the achievement of the experimental students to that of students in the control group. For this purpose nine sections of the Metropolitan Achievement Test were used. Achievement on each of these sections was analyzed to reveal differences not only between the experimental and control groups but also between experimental and control group females, experimental and control group males, and between ability levels of experimental and control groups, as measured by the Otis-Lennon Mental Ability Test.

H_1 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_2 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_3 There will be no significant differences in post-test standard scores in Word Knowledge as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

Table 1 on the next page summarizes the analysis of variance on the Word Knowledge subtest. Hypotheses one, two, and three must be accepted. There were no significant differences between experimental and control groups.

TABLE I

SUMMARY

ANALYSIS OF VARIANCE - WORD KNOWLEDGE

SOURCE	SS	df	MS	F	P Less Than
Pretest	46726.454	1	46726.454	892.322	.0001*
Sex	1.953	1	1.953	< 1	.847
I Q	1729.106	2	364.553	16.510	.0001*
Treatment	.376	1	.376	< 1	.933
Sex x IQ	28.460	2		<1	.766
Sex x Treatment	.209	1	.209	<1	.950
IQ x Treatment	128.695	2	64.348	1.229	.294
Sex x IQ x Treatment	136.983	2	68.492	1.308	.271
Residual	12672.327	242	52.365		

There were significant differences among students by IQ level. Those students in the high IQ range had significantly higher standard scores than those in the average and below average IQ groups. Students in the average group had significantly higher standard scores than students in the low IQ group.

H_4 There will be no significant differences in post-test standard scores in Reading Comprehension as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_5 There will be no significant differences in post-test standard scores in Reading Comprehension as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_6 There will be no significant differences in post-test standard scores in Reading Comprehension as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

Table 2, page 31, summarizes the analysis of variance for the Reading portion of the MAT. Hypotheses four, five, and six must be accepted; there are no significant differences between experimental and control students on this section of the achievement test. The only significant differences occurred among students of varying ability. Those students in the high IQ group had significantly higher standard scores than either those students in the average or below average groups. Students in the average IQ range had significantly higher scores than those below average in ability.

H_7 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_8 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_9 There will be no significant differences in post-test standard scores in Language Arts as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

TABLE 2

SUMMARY

ANALYSIS OF VARIANCE - READING

SOURCE	SS	df	MS	F	P Less Than
Pretest	54402.589	1	54402.589	704.296	.0001*
Sex	3.721	1	3.721	< 1	.827
I Q	3355.071	2	1677.536	21.717	.0001*
Treatment	0.144	1	0.144	< 1	.966
Sex x IQ	170.829	2	85.415	1.106	.333
Sex x Treatment	3.644	1	3.644	< 1	.828
IQ x Treatment	12.415	2	6.208	< 1	.922
Sex x IQ x Treatment	30.016	2	15.008	< 1	.825
Residual	18693.037	242	77.244		

Table 3, page 33, indicates that in addition to the anticipated significant differences among students in Language Arts by ability group that there was also a significant interaction between sex, IQ and treatment. Students in the high IQ group had significantly higher standard scores than those in the average and below average groups. Those students of average ability had higher scores than students that were below average in ability.

Males in the high IQ experimental group had significantly higher standard scores than did control males in the average and below average IQ groups. Their scores were also significantly higher than below average IQ experimental females and the low ability males and females in the experimental group.

Females in the high IQ experimental group had standard scores that were significantly higher than females and males in the below average IQ control group. Their scores were also significantly higher than the below average ability males in the experimental group. High IQ females in the control group had significantly higher scores than did experimental males in the below average ability level.

Hypothesis seven was accepted. There were no significant differences between experimental and control groups by ability level.

Hypotheses eight and nine were rejected. There were significant differences in the experimental and control groups. These differences were mediated by the IQ level of the students. The high IQ students in the experimental group performed significantly better than the average and below average students in the control groups. The differences between them and the high IQ students in the control group were not significant though experimental males and females scored higher than high IQ control students.

H_{10} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{11} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{12} There will be no significant differences in post-test standard scores in Spelling as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

TABLE 3

SUMMARY

ANALYSIS OF VARIANCE - LANGUAGE ARTS

SOURCE	SS	df	MS	F	P Less Than
Pretest	42256.231	1	42256.231	883.859	.0001*
Sex	1.332	1	1.332	1	.8676
I Q	1615.370	2	807.685	16.894	.0001*
Treatment	41.447	1	41.447	1	.3527
Sex x IQ	34.364	2	17.182	1	.7039
Sex x Treatment	4.326	1	4.326	1	.7368
IQ x Treatment	198.228	2	99.114	2.073	.1258
Sex x IQ x Treatment	313.897	2	156.949	3.283	.0380*
Residual	11569.723	242	47.809		

Table 4 on the following page summarizes the findings in Spelling. The high IQ students had significantly higher standard scores than did the average and below average students. This table also indicates that there were significant interactions between sex and IQ and sex and treatment.

The sex and IQ interaction revealed that females in the high IQ group had significantly higher standard scores than did females and males in the below average ability group and males in the average ability group. Males in the high IQ group had significantly higher standard scores than did females and males in the below average group and males in the average IQ group. Females of average IQ had significantly higher standard scores than did females who were below average in ability.

For the sex and treatment interaction the following was found: males in the experimental group had significantly higher standard scores than did males in the control group. Females in the experimental group had significantly higher scores than did the males in the control group. The female control group had significantly higher scores than either the female experimental group or the male control group.

Hypothesis ten must be accepted. There were no significant differences between the experimental and control groups.

Hypothesis eleven must be rejected. The control females were significantly higher than the experimental females.

Hypothesis twelve must be rejected. The experimental males were significantly higher than the control males.

H_{13} There will be no significant differences in post-test standard scores in Math computation as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{14} There will be no significant differences in post-test standard scores in Math computation as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{15} There will be no significant differences in post-test standard scores in Math computation as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

TABLE 4

SUMMARY

ANALYSIS OF VARIANCE - SPELLING

SOURCE	SS	df	MS	F	P Less Than
Pretest	13252.181	1	13252.181	281.595	.0001*
Sex	29.293	1	29.293	.622	.4309
I Q	1225.429	2	612.715	13.020	.0001*
Treatment	1.066	1	1.066	1	.8805
Sex x IQ	338.615	2	169.308	3.598	.0280*
Sex x Treatment	252.786	1	252.786	5.371	.0213*
IQ x Treatment	69.318	2	34.659	1	.5158
Sex x IQ x Treatment	168.254	2	84.127	1.788	.1675
Residual	11388.798	242	47.061		

Table 5, page 37, summarizes the analysis of variance for Math Computation. There were significant differences by IQ range, treatment (experimental/control), and an IQ and treatment interaction.

As on other subtests of the MAT, those students in the higher IQ ranges did significantly better than those students who were below average.

The standard scores for the experimental group were significantly higher than those of the control group. The standard score of the experimental group was 104.1988 and that of the control group was 101.3097.

For the IQ and treatment interaction it was also found that the experimental group made significant gains over the control group. These findings may be summarized as: students in the high IQ experimental group were significantly above the high IQ control group, the average IQ control group, and the below average IQ control group; the high IQ experimental group was also significantly higher than the below average IQ experimental group, as was the average IQ experimental group.

In the area of Math computation skills the experimental program clearly gave the high IQ students an advantage over all students in the control group.

H_{16} There will be no significant differences in post-test standard scores in Math concepts as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{17} There will be no significant differences in post-test standard scores in Math concepts as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{18} There will be no significant differences in post-test standard scores in Math concepts as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

These three hypotheses must be accepted. As shown in Table 6 on page 38 there were no significant differences between experimental and control groups on the Math concepts part of the MAT. The only significant differences located were in the IQ area. Students in

TABLE 5

SUMMARY

ANALYSIS OF VARIANCE - MATH COMPUTATION

SOURCE	SS	df	MS	F	P Less Than
Pretest	33275.640	1	33275.640	470.280	.0001*
Sex	1.295	1	1.295	<1	.8925
I Q	1893.316	2	946.658	13.379	.0001*
Treatment	386.599	1	386.599	5.464	.0202*
Sex x IQ	118.057	2	59.029	<1	.5611
Sex x Treatment	41.719	1	41.719	<1	.4433
IQ x Treatment	1340.984	2	670.492	9.476	.0003*
Sex x IQ x Treatment	34.555	2	17.278	<1	.7867
Residual	17123.231	242	70.757		

TABLE 6

SUMMARY

ANALYSIS OF VARIANCE - MATH CONCEPTS

SOURCE	SS	df	MS	F	P Less Than
Pretest	38540.537	1	38540.537	510.845	.0001*
Sex	51.118	1	51.118	< 1	.4112
I Q	3796.812	2	1898.406	25.162	.0001*
Treatment	31.590	1	31.590	< 1	.5182
Sex x IQ	11.553	2	5.777	< 1	.9258
Sex x Treatment	< 1	1	< 1	< 1	.9897
IQ x Treatment	268.779	2	134.390	1.781	.1685
Sex x IQ x Treatment	28.389	2	14.195	< 1	.8302
Residual	18257.618	242	75.445		

the higher IQ range had significantly higher scores than did those in the average and below average groups. Students in the average IQ range had scores significantly higher than those in the lowest ability group.

H_{19} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{20} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{21} There will be no significant differences in post-test standard scores in Math Problem Solving as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

There were no significant differences between experimental and control groups in Math Problem Solving, therefore, these three hypotheses must be accepted. Table 7, page 40, indicates that IQ was again a significant factor influencing achievement with students in the above average and average IQ ranges achieving significantly more than those in the lowest ability group.

H_{22} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{23} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{24} There will be no significant differences in post-test standard scores in Science as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

TABLE 7

SUMMARY

ANALYSIS OF VARIANCE - MATH PROBLEM SOLVING

SOURCE	SS	df	MS	F	P Less Than
Pretest	31462.575	1	31462.575	391.458	.0001*
Sex	25.733	1	25.733	<1	.5720
I Q	1987.986	2	993.993	12.367	.0001*
Treatment	86.368	1	86.368	1.075	.3009
Sex x IQ	68.760	2	34.38	<1	.6584
Sex x Treatment	31.152	1	31.152	<1	.5342
IQ x Treatment	258.971	2	129.486	1.611	.1999
Sex x IQ x Treatment	59.184	2	29.592	<1	.6979
Residual	19450.206	242	80.373		

Table 8, page 42, summarizes the analysis of data on Science achievement. All three hypotheses must be accepted because of lack of significant differences between the experimental and control group. Those students in the high and average IQ ranges continued to out perform students in the lowest ability group.

H_{25} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental and control groups by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{26} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental females and control females by ability level as measured by the Otis-Lennon Mental Ability Test.

H_{27} There will be no significant differences in post-test standard scores in Social Studies as measured by the Metropolitan Achievement Test between experimental males and control males by ability level as measured by the Otis-Lennon Mental Ability Test.

These three hypotheses were not rejected. There were no significant differences between experimental and control groups in achievement on the Social Studies portion of the MAT (See Table 9, page 43). Students in the highest IQ and average IQ groups performed at significantly higher levels than those students in the low IQ ranges.

Conclusions

1. IQ is a very important factor in performance of the Metropolitan Achievement Test.

2. Language Arts, Spelling and Math Computation were areas in which students in the experimental group did significantly better (See discussion of hypotheses for limitations).

3. Table 10, page 44, shows gains for experimental and control students between pre and post-tests. Experimental students made higher gains on eight out of the eleven sections of the test.

The evidence in this study appears to indicate that the process of personalizing instruction as implemented at the Fort Clarke Middle School does enhance achievement significantly of all or part of the experimental group in some areas of instruction.

TABLE 8

SUMMARY

ANALYSIS OF VARIANCE - SCIENCE

SOURCE	SS	df	MS	F	P Less Than
Pretest	38159.016	1	38159.016	744.573	.0001*
Sex	131.543	1	131.543	2.567	.1104
I Q	775.641	2	387.821	7.567	.0010*
Treatment	5.186	1	5.186	< 1	.7507
Sex x IQ	46.608	2	23.304	< 1	.6411
Sex x Treatment	9.347	1	9.347	< 1	.6697
IQ x Treatment	122.789	2	61.395	1.198	.3033
Sex x IQ x Treatment	55.716	2	27.858	< 1	.5870
Residual	12402.390	242	51.250		

TABLE 9

SUMMARY

ANALYSIS OF VARIANCE - SOCIAL STUDIES

SOURCE	SS	df	MS	F	P Less Than
Pretest	47698.513	1	47698.513	699.867	.0001*
Sex	93.932	1	93.932	1.378	.2416
I Q	1210.334	2	605.167	8.879	.0004*
Treatment	44.048	2	22.024	1	.7291
Sex x IQ	17.702	1	17.702	1	.6108
Sex x Treatment	292.715	2	146.358	2.147	.1168
IQ x Treatment	162.995	2	81.498	1.196	.3040
Residual	16493.182	242	68.154		

TABLE 10

Gain In Achievement

	Experimental Team	Control Team	Gain Difference
Word Knowledge	6.4524	6.4729	-0.0205
Reading	6.8650	6.6201	+0.2449
Total Reading	5.9048	7.0388	-1.1340
Language Arts	5.4841	4.3798	+1.1043
Spelling	4.8016	3.1938	+1.6078
Math Comp.	8.8651*	4.8992	+3.9659
Math Concepts	7.1587	5.6744	+1.4843
Math Prob. Solv.	5.1984	5.8217	-0.6233
Total Math	6.8095	6.1318	+0.6777
Science	4.1746	4.1706	+0.0040
Social Studies	6.6984	5.3644	+1.3340

*$p < .05$

Self Concept

The purpose of this study was to analyze gains in professed and inferred self-concept-as-learner of students who participated in the Personalizing Instruction for the Middle School Learner Project. These gains were compared to those of the other eighth grade team at Fort Clarke Middle School which served as the control group. The Coopersmith's Self-Esteem Inventory and The Florida Key were analyzed to determine differences in the professed and inferred self-concept-as-learner between not only the experimental and control groups, but also between experimental and control females, experimental and control males, and experimental and control group students who scored above and below the median on the pretests.

Tables 12 and 13 found on pages 45 and 46 present the summary tables from the three way analysis of variance performed on the gain scores of the Self-Esteem Inventory and The Florida Key.

TABLE 12

SUMMARY

ANALYSIS OF VARIANCE
SELF-ESTEEM INVENTORY GAIN SCORES

SOURCE	SS	df	MS	F	P Less Than
Pretest	915.031	1	915.031	22.474	.0001*
Sex	5.457	1	5.457	0.134	.7149
Treatment	1.785	1	1.785	0.044	.8344
Pretest x Sex	42.681	1	42.681	1.048	.3077
Pretest x Treatment	23.226	1	23.226	0.570	.4514
Sex x Treatment	15.759	1	15.759	0.387	.5349
Pretest x Sex x Treatment	38.541	1	38.541	0.947	.3323
Residual	5496.606	135	40.716		

TABLE 13

SUMMARY

ANALYSIS OF VARIANCE
FLORIDA KEY GAIN SCORES

SOURCE	SS	df	MS	F	P Less Than
Pretest	3880.212	1	3880.212	26.618	.0001*
Sex	44.545	1	44.545	0.306	.5817
Treatment	902.102	1	902.102	6.188	.0147*
Pretest x Sex	28.060	1	28.060	0.192	.6619
Pretest x Treatment	331.789	1	331.789	2.276	.1348
Sex x Treatment	18.716	1	18.716	0.128	.7209
Pretest x Sex x Treatment	76.646	1	76.646	0.526	.4702
Residual	13411.059	92	145.772		

H_{28} There will be no significant differences in gains between experimental and control groups on Coopersmith's Self-Esteem Inventory.

The results from Table 12 indicate that this null hypothesis cannot be rejected. The observed F ratio of 0.044 is not significant; however, the findings in Table 11 suggest a trend in favor of the experimental group which had a mean gain of +2.478, while the control group had a mean gain of +1.789.

TABLE 11

MEAN GAIN ON THE SELF-ESTEEM INVENTORY: TREATMENT GROUP

Group	n	Mean gain	Standard Deviation
Experimental	67	+2.478	7.110
Control	76	+1.789	6.567

H_{29} There will be no significant differences in gains between experimental and control groups on The Florida Key.

From Table 13, page 46, the observed F of 6.188 is greater than the critical F. Therefore, the null hypothesis is rejected. Table 14, below, presents the mean gains for the experimental and control groups on The Florida Key. The experimental group's gain was +4.268 while the control group's gain was -2.508; therefore the gain of the inferred self-concept-as-learner of the experimental team was significantly greater than the gain of the control group.

TABLE 14

MEAN GAIN ON THE FLORIDA KEY: TREATMENT GROUP

Group	n	Mean Gain	Standard Deviation
Experimental	41	+4.268	12.276
Control	59	-2.508	14.480

H_{30} There will be no significant differences in gains between experimental and control males on Coopersmith's Self-Esteem Inventory.

The summary of the analysis of variance (Table 12, page 45) indicates that the observed F (0.387) did not reach the critical F. Therefore, this null hypothesis is not rejected. There is a trend, however, that experimental males had a higher mean gain than did control males (See Table 15). Experimental males gained +2.767. Control males gained +1.314.

TABLE 15

MEAN GAIN ON THE SELF-ESTEEM INVENTORY: MALES

Group	n	Mean Gain	Standard Deviation
Experimental Males	30	+2.767	5.859
Control Males	35	+1.314	6.234

H_{31} There will be no significant differences in gains between experimental males and control males on The Florida Key.

From Table 13, page 46, the observed F (0.128) did not reach the critical F. Consequently, this hypothesis cannot be rejected. Experimental males did have a higher mean gain (+4.176) than did control males (-1.652) (See Table 16).

TABLE 16

MEAN GAIN ON THE FLORIDA KEY: MALES

Group	n	Mean Gain	Standard Deviation
Experimental Males	17	+4.176	13.501
Control Males	23	-1.652	13.746

H_{32} There will be no significant differences in gains between experimental females and control females on Coopersmith's Self-Esteem Inventory.

The observed F ratio (0.387) did not reach the critical F. Therefore, we cannot reject this hypothesis, but experimental females had a slightly higher mean gain (+2.243) than did control females (+2.195) (See Table 17).

TABLE 17

MEAN GAIN ON THE SELF-ESTEEM INVENTORY: FEMALES

Group	n	Mean Gain	Standard Deviation
Experimental Females	37	+2.243	8.057
Control Females	41	+2.195	6.889

H_{33} There will be no significant differences in gains between experimental females and control females on The Florida Key.

Since the observed F of 0.126 (See Table 13, page 46) did not reach the critical F, this hypothesis cannot be rejected. Table 18 indicates that experimental females had a higher mean gain (+4.333) than did control females (-3.056).

TABLE 18

MEAN GAIN ON THE FLORIDA KEY: FEMALES

Group	n	Mean Gain	Standard Deviation
Experimental Females	24	+4.333	11.631
Control Females	36	-3.056	15.096

H_{34} There will be no significant differences between the gains of experimental and control students who scored below the median on the pretest of Coopersmith's Self-Esteem Inventory.

H_{35} There will be no significant differences between the gains of experimental and control students who scored above the median on the pretest of Coopersmith's Self-Esteem Inventory.

From Table 12, page 45, the observed F (0.570) did not reach the critical F. Therefore, Hypotheses 34 and 35 cannot be rejected. Table 19 indicates that experimental students who scored below the median had a higher mean gain (+5.333) than did control students (+4.324). Control students who scored above the mean had a higher mean gain (-0.048) than did experimental students (-0.806).

TABLE 19

MEAN GAIN ON THE SELF-ESTEEM INVENTORY: HIGH AND LOW PRETEST GROUPS

Group	n	Mean Gain
Experimental High	31	-0.806
Control High	42	-0.048
Experimental Low	36	+5.333
Control Low	34	+4.324

(Note: Pretest Median 37.056)

H_{36} There will be no significant differences between the gains of experimental and control students who scored below the median on the pretest of The Florida Key.

H_{37} There will be no significant differences between the gains of experimental and control students who scored above the median on the pretest of The Florida Key.

From Table 13, page 46, the observed F testing these hypotheses (2.276) did not reach the critical F. Therefore, these hypotheses

cannot be rejected. The observed F did approach significance. Experimental students who scored below the median had a higher mean gain (+8.591) than did control students (5.821) (See Table 20). Experimental students who scored above the median on the pretest also had a higher gain (-1.579) than did control students (-10.032) (See Table 20).

TABLE 20

MEAN GAIN ON THE FLORIDA KEY: HIGH AND LOW PRETEST GROUPS

Group	n	Mean Gain
Experimental High	19	-1.579
Control High	31	-10.032
Experimental Low	22	+8.591
Control Low	28	+5.821

Conclusions

The purpose of this research was to analyze changes in self-concept-as-learner of students who participated in the Personalizing Instruction for the Middle School Learner Project. Changes in professed and inferred self concept of students in the experimental group were compared with changes among students in the control group.

Ten null hypotheses were tested at the .05 level of significance. The null hypothesis which was rejected was Null Hypothesis Number 9. This hypothesis stated "There will be no significant difference in gains between experimental and control groups on The Florida Key."

The observed F ratio of 6.188 leads to the conclusion that the Personalizing Instruction for the Middle School Learner Project produced a significant difference in the inferences made by teachers about students as learners in the experimental group. This finding is especially important since these attitudes generally lead to an atmosphere in the classroom which is much more conducive to student success in academic as well as other types of endeavors.

Although none of the other nine null hypotheses could be rejected, there were trends favoring the experimental team on eight

of the hypotheses. Hypotheses Number 36 and 37 had an observed F ratio of 2.276. The trend on both hypotheses favored the experimental team, and a larger sample size may have resulted in a significant finding.

This study shows an overall gain in both professed and inferred self-concept-as-learner for students who participated in this research project. Of primary importance is the fact that students on the experimental team had a significant gain in inferred self concept when compared with the control team. Future studies will have to demonstrate if similar findings result under similar experimental conditions.

The evidence in this study indicates that the process for personalizing instruction as implemented at Fort Clarke Middle School does enhance self-concept-as-learner.

SECTION II

The four teachers on the experimental team were asked to complete reaction sheets at various intervals throughout the year. These sheets indicated their reactions to different parts of the instructional units presented throughout the year and offered insights into teacher perceptions of the role of the team media specialist.

Each of the nine questions contained in the teacher reaction sheet is discussed individually in terms of team responses.

Question 1

How successful do you feel that this unit was? In addition to any comments you might make in this area, please indicate your feeling numerically on the scale presented below:

unsuccessful 1__2__3__4__5__6__7__8__9__10__ successful

Numerical responses to this question ranged from "7" to "10" with an average response of 9.4. This rating appears to indicate that teachers had positive feelings about the value of learning experiences provided for students by the team.

Question 2

What are the chief factors which contributed to the success or failure of the unit?

Team members attributed the success of the unit to the following: "a multi-media approach to learning; resource speakers; individual unipacs; early planning and preparation; the gathering of materials by the team media specialist; the number of different types of learning alternatives available to students; hands-on activities for students; the organization of the learning alternatives; individual assignments given to each student based on ability/interests/learning styles; the media specialist; and the team atmosphere of cooperation." The two factors mentioned most often by team members were the large number of different learning alternatives available to students, and the multi-media approach to learning.

Question 3

What activities do you feel were most successful? Why were they successful?

The activities which were thought to be most successful by various members of the teaching team were: slide productions; biographies of artists; students writing their own poetry; speakers and other types of resource people; hands-on activities; instructional games (fractions bingo, fractions dominoes); creative writing; labs; media use; and individual unipacs. The reason given most frequently for the success of these activities was that students were highly motivated because they had a wide variety of available activities geared to their individual needs and interests, and were allowed many opportunities to apply what they learned.

Question 4

Which activities do you feel were least successful? Why?

The activities which team teachers felt to be least successful were generally those for which they had an insufficient amount of time to plan effectively, such as previewing films in some instances. Another factor contributing to the lack of success of some activities was the shortage of supplies available to perform certain activities (never enough rubber bands to complete activities requiring them). Finally, it was felt that some activities, such as selected math learning modules, were too difficult for some students, boring, and constructed in an illogical manner. (These were modules which had been developed in another middle school in the county.)

Question 5

What were some of the difficulties you experienced in constructing this unit?

Some of the difficulties that teachers listed in constructing various units were: (1) "choosing and limiting materials and activities when so many activities were available; (2) keeping up with the paperwork connected with individualizing instruction; (3) finding appropriate commercially produced materials on some topics which were geared to individual student needs; (4) allowing enough time for adequate preparation of units; and (5) determining the amount of information that needed to be covered in a unit."

Question 6

How do you perceive that these difficulties could be overcome in the future?

Teachers felt that most of the problems listed in question 5 could be overcome if more time were allowed for unit preparation, more local production of materials were undertaken, and if they had more experience with the instructional approach used in this project in order to know which activities would be most effective with students. Teachers also wanted a greater amount of emphasis placed on procuring and locating appropriate materials on which to base additional learning alternatives.

Question 7

What role did the team media specialist play in the planning, implementation and evaluation of the unit?

According to teachers, the team media specialist's major roles in the planning of a unit were: to offer input in the formulation of unit and instructional objectives; to gather appropriate print and non-print materials which might be used as the basis for learning alternatives; to suggest a wide variety of learning activities geared to student learning styles; to make teachers aware of other types of resources, such as speakers and sites for field trips; to organize materials and media related activities according to unit objectives and student learning styles when possible; and to define specifications for materials which need to be locally produced and, in some instances to produce materials (when no technical personnel were available to perform this function).

The team media specialist's chief contributions in implementation of a unit were: working with students periodically to help them produce materials related to topics being studied; organizing learning alternatives; arranging for materials and other resources to be available at the time and place at which they were needed; and helping to set up learning activities.

Team teachers stated that the team media specialist's major role in evaluation of the unit consisted of helping teachers to spot problems related to learning alternatives being offered to students. Once these problems were identified, the media specialist, working with other team members, suggested modifications or changes in learning alternatives to make them more meaningful to students. The team media specialist also participated in the overall evaluation of each unit after the unit was completed.

Question 8

What function did the media specialist perform that probably could not or would not otherwise have been a part of the unit?

Team teachers felt that the major functions performed by the media specialist that would not otherwise have been part of the units were: locating and organizing a wide variety of learning alternatives geared to student learning needs; coordinating the use of these activities when the units were implemented; and defining specifications for materials that needed to be made and then making arrangements to have them locally produced.

Question 9

What changes would you suggest in the team media specialist's role to make her a more useful member of the team?

Team teachers had no changes to suggest in the role of the team media specialist. The comments that they made in reply to this question ranged from "The things that the media specialist did for me in this unit could not have happened without her. Materials were not plentiful--She (the media specialist) had to make and really search for those that were used in developing learning alternatives." to "The media specialist was fantastic in all areas of this interdisciplinary unit."

Teacher reactions to the questions included in this section clearly indicated the importance of the duties performed by the team media specialist. Without the availability of this professional expertise on a continuing basis, teachers generally cannot provide the range and types of activities necessary to meet the learning needs, interests and abilities of their students.

SECTION III

In the final section of this evaluation the project is discussed from the principal's point of view. Through this means a

broader view of the present and potential implications of this approach to instruction within a school are presented.

A Principal's Perceptions of the Fort Clarke Media Project

William Cake, Principal
Fort Clarke Middle School
Gainesville, Florida

Certainly one in a position of responsibility for the intellectual growth of young people is concerned about this growth in terms of measurable results. However, this principal desires to leave that area to the professional data analyst and pursue those intangible, affective, difficult to measure processes which contribute so significantly to the effective operation of a school. Some of these processes are very difficult to describe to one unfamiliar with Fort Clarke and are predicated on basic feelings of this administrator.

The most reassuring result of this project was to re-kindle our desire to make media an integral supporting function of the teaching learning process. One of our original goals in planning Fort Clarke hinged on making our learning resources as accessible as possible to students. However, in our attempts to open a new and somewhat different school we had to reorder our priorities and this goal was never fully implemented.

Now that some of the initial problems of opening a new school have been worked out this principal has observed a desire on the part of the entire media staff to incorporate project processes into those teaching teams that exhibit the readiness to participate. We have received a necessary shot in the right spot at the right time.

The project team has demonstrated a high degree of teacher and student morale and cohesiveness. This writer feels that these attitudes can be directly attributed to the initial preparedness provided by the project and the day-to-day expertise offered by a most competent media specialist. Team members along with project staff were given time to conceptualize a planning model and then began planning for that first hectic unit of instruction. This initial planning in an unharried summer atmosphere provided the cohesiveness that carried through the remainder of the year and insured the same results from students.

An integral aspect of the project was the conceptualization of cognitive style mapping and its use in day-to-day instruction. There is no doubt in this principal's mind that all good teachers are aware that different students learn in different ways. However,

this team of teachers through the media specialist made it a goal to insure that the basic learning styles of students were provided for whenever possible.

Through the wider use of media, students on the experimental team were able to be divided into smaller groups depending on the exercise being presented and the techniques or media being used. The feeling here is that extended use of small group instruction provides for and insures the exercise of interaction and cooperation that is so sadly lacking in this "helter-skelter", independent, "look-out-for-yourself" type of society that we are a part of--a small, seemingly insignificant project result, but in the eyes of this educator a necessity if we hope to improve a troubled society.

In this day and time when our public relations function is sadly lacking, this project provided the opportunity for a wide range of community resources to be utilized as an integral segment of the instructional process. The media specialist was able to insure the timely and more frequent use of these important community members in such a way that each felt that he made an essential contribution to students in the school.

The students expressed a very positive response to this wider use of "people" resources. Too often we as teachers attempt to convince students that we have all of the answers. It was refreshing to observe a high degree of politeness and interest on the part of students that is rare in this day and time. This only comes when students are prepared ahead of time and the resource is appropriate and worthwhile.

Another interesting result of the project was the wide use and therefore familiarization of students with all types of media and equipment. Materials that are new and unique to many students are now taken for granted by this team of students. These students should now expect, demand, or seek out more than a "textbook" approach to meet their learning needs.

Many students were directly involved in the production of materials and the use of media related equipment. Surely this will have lasting results as these students become more self directed and responsible for their own learning. Hopefully some will be in a position to someday assist others with these newfound skills. It can't help but contribute to an appreciation for more varied ways of learning.

The most interesting observation of this project was the healthy competition created and exhibited by the control team here at Fort Clarke. This team, from the outset accepted it as a challenge to

prevent the project team from out performing them in any area. Academics were strengthened and many methods were utilized to keep student morale at a peak thus insuring little if any significant difference in test results.

This competition, although greatly affecting comparative results, was certainly a welcomed ingredient in the school's success this year. No principal would find such results unacceptable.

Finally, it is obvious to this writer that our entire media staff is better able to envision a total media approach to instructional planning. Plans have been made to attempt the same type of approach on a school-wide basis by expanding the instructional services of the team media specialist to other teams. More importantly, teachers, both project team members and interested observers, see the need for such an expansion of services school wide and are more willing to commit the necessary but scarce dollars to assure these services. Hopefully this positive attitude toward an expanded media role will be assimilated on a countywide basis.

Measurable results may not be significant but to this principal the results that insure the success of a school have been provided by this project beyond all of his hoped-for expectations--the catalyst that cannot be pulled from professional journals or implied by education professors--an unusual media specialist plus a highly competent team plus a funded idea plus confidence by school and project administrators equals better prepared students. What is a more worthwhile goal in education?

PART V

CONCLUSION

The value of adding a media specialist to the teaching team has been demonstrated through gains in student self concept and academic achievement, and through principal and teacher evaluations of the media specialist's unique professional role in individualizing instruction. However, from the inception of this project it was recognized that the instructional function of the media specialist is built upon the professional instructional support role. If an insufficient number of professional staff members are performing management, selection, organizational and other professional tasks within the media program, then media professionals working in an instructional capacity will soon be unable to carry out their assigned duties. Consequently, adequate staffing of both types of roles must be the goal of educators and others who are concerned about providing quality education for students in elementary and secondary schools.

RECOMMENDATIONS FOR FURTHER STUDY

1. Studies should be initiated on a school wide basis to determine how many teaching teams or teachers a media specialist functioning in an instructional capacity can serve effectively.

2. Further investigation of the relationship between the professional instructional and instructional support functions of the media staff should be performed.

3. Preservice training programs for school media specialists should be examined to determine if media specialists are being trained to perform in an instructional capacity.

4. Preservice training programs for teachers should be investigated to ascertain if teachers are being taught to utilize the skills of other educational specialists such as the media specialist in order to individualize instruction.

5. Additional studies should focus on effective manageable methods of specifically matching failing students with learning alternatives geared to their individual learning needs.

6. More effective methods of organizing learning alternatives to make them easily accessible on a school wide basis should be developed.

7. Various uses of the computer in this type of instructional approach should be investigated.

Investigation of these and other topics related to media staffing patterns and individualization of instruction will lead to more effective utilization of school media personnel.

APPENDIX

THE ROLE OF COGNITIVE STYLE MAPPING IN THE PERSONALIZING INSTRUCTION PROJECT

Introduction

Cognitive style mapping was used in this project to indicate the ways in which students prefer to perceive meaning in their learning environments. By analyzing the information contained in the cognitive style map of a student one can determine in large part whether a student is likely to learn well from various learning alternatives provided other diagnostic information about the student's ability, etc. is taken into consideration.

The media specialist's role in relation to cognitive style mapping was to analyze materials and activities in terms of their cognitive elements and then to help teachers prescribe, formulate, utilize, and evaluate learning alternatives which took into account different student cognitive learning styles within a unit. Realistically, this meant encouraging and assisting teachers to provide a wide variety of learning alternatives containing as many cognitive elements as possible for each objective in the unit. In this way students could be given choices of learning alternatives most geared to their learning needs. This was not always the case, though, because for some objectives in the unit, the teacher and the media specialist were able to formulate only one or two learning alternatives due to the lack of materials, time, space, etc. Attempts were made whenever possible to match failing students with learning alternatives geared to their learning strengths.

Cognitive Style Mapping

Cognitive style mapping is a method of indicating the ways in which students seek meaning and become informed. This concept is based on the premise that if a student's cognitive learning style is diagnosed and learning alternatives which capitalize on his learning strengths are offered to him, then the student will experience success in his educational program.

Certain types of diagnostic test data are used to make up the three sets comprising a student's cognitive map. In the first set the student's use of symbols to acquire knowledge and meaning is examined. The two types of symbols which receive consideration are the theoretical (words and numbers) and the qualitative ("symbols

which present and then represent to the awareness of the individual that which the symbol is, e.g., sense of smell, feelings, commitments, and values"). Specifically, the four theoretical symbols are:

A. T(VL) -- Theoretical Visual Linguistic -- ability to find meaning from words you see (reading)

B. T(AL) -- Theoretical Auditory Linguistic -- ability to acquire meaning through hearing spoken words

C. T(VQ) -- Theoretical Visual Quantitative -- written numerical symbols, relationships, and measurements

D. T(AQ) -- Theoretical Auditory Quantitative -- spoken numerical symbols, relationships, and measurements.

Qualitative symbols associated with sensory stimuli are:

A. Q(A) -- Qualitative Auditory -- sense of hearing (e.g., sounds, musical tones, etc.)

B. Q(O) -- Qualitative Olfactory -- smell

C. Q(S) -- Qualitative Savory -- taste

D. Q(T) -- Qualitative Tactile -- touch

E. Q(V) -- Qualitative Visual -- sight.

Qualitative programmatic symbols are classified under Q(P) -- Qualitative Proprioceptive. (Primarily motor responses and skills). This takes into consideration such things as left and right-handed and -eyed and physical timing.

The qualitative symbols associated with cultural codes are:

A. Q(CEM) -- Qualitative Code Empathetic -- sensitivity to the feelings of others

B. Q(CES) -- Qualitative Code Esthetic -- sensitivity to the beauty of an object or an idea

C. Q(CET) -- Qualitative Code Ethics -- commitment to a set of values (does not imply morality)

D. Q(CH) -- Qualitative Code Histrionics -- acting, or playing a role

E. Q(CK) -- Qualitative Code Kinesics -- body language

F. Q(KH) -- Qualitative Code Kinesthetics -- simulate any acceptable societal form (this is a new definition, changed since the publication of this pamphlet).

G. Q(CP) -- Qualitative Code Proxemics -- knowledge of social distance

H. Q(CS) -- Qualitative Code Synnoetics -- personal knowledge of oneself

I. Q(CT) -- Qualitative Code Transactional -- salesmanship

J. Q(CTM) -- Qualitative Code Temporal -- Social timing.

In the second set of the cognitive style map cultural influences on a student are examined since these play an important part in determining the meaning which the student will assign to symbols. There are three cultural determinants of the meaning of symbols:

A. I -- Individuality

B. A -- Associates (peers)

C. F -- Family

The third set of the cognitive map is modalities of inference. Diagnostic test information related to this category reveals the reasoning pattern(s) which an individual can use in deriving meaning. These forms of inference are:

A. M -- Magnitude -- need to use norms or categorical classifications to define things in order to understand them;

B. D -- Difference -- one-to-one contrasts or comparisons of selected characteristics;

C. R -- Relationship -- ability to synthesize through analysis of a situation to discover its component parts;

D. L -- Appraisal -- uses M, D, and R, giving equal weight to all three;

E. K -- Deductive reasoning.

The three sets viewed collectively comprise the cognitive style of the student. A maximum of 3,200 different profiles of the elements are possible for an individual to show in his map at a given level of educational development (There are 20 levels of educational development resulting in 1,200,000 possible profiles.)[10]

Test Administration

Students participating in the project were asked to complete a cognitive mapping inventory. Cognitive maps developed from an analysis of information obtained through the inventory were printed out in the form of a Cartesian product of three sets. The first set indicated a student's tendency to use certain types of symbols, his ability to understand words and numbers, qualitative sensory symbols, qualitative programmatic symbols, and qualitative codes. The second set indicated cultural determinants, or influences which the student brought to bear in deriving meaning from symbols; and the third set, modalities of inference or reasoning patterns, indicated the manner in which he inferred or reasoned.

Major, minor and negligible orientations were also indicated by inventory scores in the different elements of style. These scores suggested strengths and weaknesses in student learning styles and methods by which students preferred to learn. A major orientation indicated a strong student learning preference while a negligible orientation meant that a student preferred not to learn in the manner indicated by the cognitive element.

A major orientation is noted by capital letters and is accorded a given element if it occurs in the 50th-99th percentile range of a distribution of that element at a given developmental level (different inventories are given to students at different age levels). For example, T(VL) would indicate a major orientation in theoretical visual linguistic symbolic mediation.

A minor orientation indicated that the student realized a score for a given element in the range of the 26th-49th percentiles of a distribution of that element at a given developmental level. The symbol for this is T'(VL), read "T prime VL."

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[10]Joseph E. Hill, "The Educational Sciences" Bloomingfield Hills, Michigan, Oakland Community College Institute for Educational Sciences. 11 pp. (unpublished paper).

A negligible orientation indicated that a student realized a score in the 25th percentile or below of a distribution of scores for a given element at a given developmental level. The symbol for this element is omitted from the individual's cognitive style map or placed at the bottom under each of the three sets. (See Q(T), I, R in the example of John Smith's cognitive map.

An illustration of the Cartesian product and a brief interpretation of parts of John Smith's cognitive map follows:

$$\begin{Bmatrix} T(AL) & T'(VL) \\ T(AQ) & Q'(O) \\ T(VQ) & Q'(S) \\ Q(A) & Q'(ES) \\ Q(V) & \\ Q(EM) & \end{Bmatrix} \times \begin{Bmatrix} A \\ F \\ \\ \\ \\ \end{Bmatrix} \times \begin{Bmatrix} M \\ D \\ \\ \\ \\ \end{Bmatrix}$$

Q(T) I R

Upon examining this student's cognitive map one finds that in the first set there is evidence that John obtains more meaning from words when he hears them than when he reads them (major T(AL) and a minor T'(VL). He can deal with written and spoken numbers equally well (major T(AQ) and T(VQ), but he experiences difficulty in gaining information through his sense of touch (negligible Q(T). This procedure of evaluating major, minor, and negligible orientations is followed throughout the three sets in order to ascertain John Smith's cognitive style.

Determining Learning Alternatives Based on Cognitive Elements

Once the cognitive maps of students were available they were used to prescribe learning alternatives within a unit. It must be pointed out, though, that learning alternatives were not prescribed on an individual basis except in some units for failing students. Instead, the strategy was to provide a variety of learning alternatives which incorporated as many cognitive elements as were appropriate and manageable for the unit. The media specialist determined cognitive elements contained in instructional materials and learning activities selected by teachers and then suggested other activities which might offer a broader range of cognitive elements. When more than one learning alternative was presented to accomplish a learning objective, students were often given choices of which activities they wanted to complete. In this way personalization of instruction was achieved to some extent.

Materials Evaluation According to Cognitive Style

In this project one of the major roles of the media specialist was evaluating materials in order to help teachers provide a broad range of top-quality learning activities geared to the learning needs of students.

Materials were evaluated on the basis of their appropriateness for the unit (teacher and media specialist), the number and types of cognitive elements they contained (media specialist), and the quality of the materials being considered (teacher and media specialist). This discussion will be limited to evaluation of cognitive elements in materials.

The media specialist was concerned in large part with cognitive elements which dealt with processes of presenting materials. Elements which were emphasized in materials evaluation were the theoretical symbols, which involved reading and listening alternatives, and the sensory qualitative codes and proprioceptive elements especially for students who had low cognitive skills and learned better through hearing, smelling, tasting, looking, touching, or moving. The rest of the qualitative elements, such as empathy, esthetics, ethics, body language, etc. were subject to much interpretation and were often not obvious in a piece of material.

The evaluation of cultural determinants in relation to material was usually ascertained from the setting in which the material was used. "I" was assigned when the student worked alone with an activity or piece of material, "A" when the material or activity was used in small groups, and "F" for teacher directed study.

In evaluating materials for modalities of inference or thought patterns the specific content of each piece of material had to be examined to determine these ratings. This part of the evaluation process proved to be overwhelming so evaluation in this area was limited.

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